

Site Assessment

Overview

A site assessment is the foundation for determining the best ways for you to **capture**, **conserve** and **reuse** water on your property. Going through this process will also give you a greater understanding of the various systems at work in your landscape and how they affect one another.

Completing this inventory of your property and analyzing your findings will give you a better idea of how much water runs off your property, and how much water you use outside your home compared to how much you use inside. This will help you identify areas of waste and opportunity.

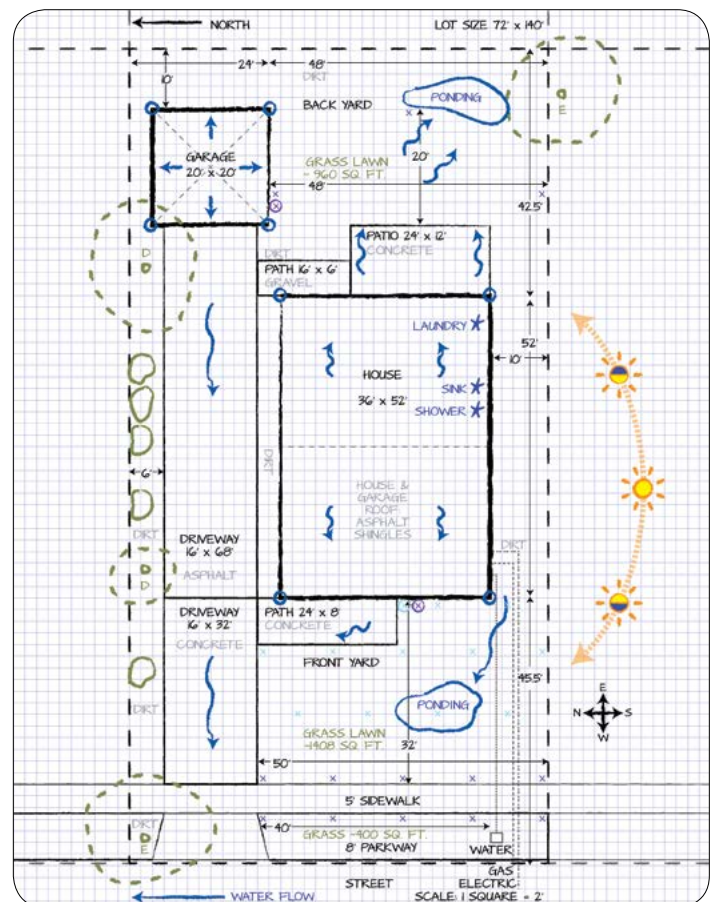
By the time you're done, you'll be able to determine which rainwater capturing and water conservation method(s) will work best for you.

Follow the steps in this guide and you'll be on your way to creating a watershed-wise home!

Your Site Plan Will Include

- A. **Create a Site Plan** of your property.
- B. **Plot** the locations of your **trees and plants**.
- C. **Chart** the seasonally changing **sun/shadow path**.
- D. **Discover** what happens to **water** on your property.
- E. **Determine** your **soil characteristics**.
- F. **Find water reuse opportunities** inside your house.
- G. **Figure** out how much **water** you currently use/ Make a **water use goal**.
- H. **Decide** which capture/ conserve/ reuse strategies work best for you.

This guide contains standard principles primarily intended for single-family homes and/or low density multi-family residential housing and may not be appropriate for every site. You assume any risk and are responsible for any consequences of modification to drainage flow. This guide was developed by The River Project and the Water LA team, under a grant from the State Coastal Conservancy, with technical assistance from the City of Los Angeles' Bureaus of Sanitation and Street Services and Departments of Building & Safety and Planning, and the Los Angeles Department of Water and Power.



Assessments will include notes on existing plants, water flow, sunlight, and greywater as well as soil conditions. Image courtesy The River Project.

A. Create a Site Plan

The first step is to **draw a plan of your property** and all its relevant features, starting with your property dimensions. Having accurate dimensions and orientation on a plan will help to understand the space. This will be the framework for your site assessments and landscape project plans.

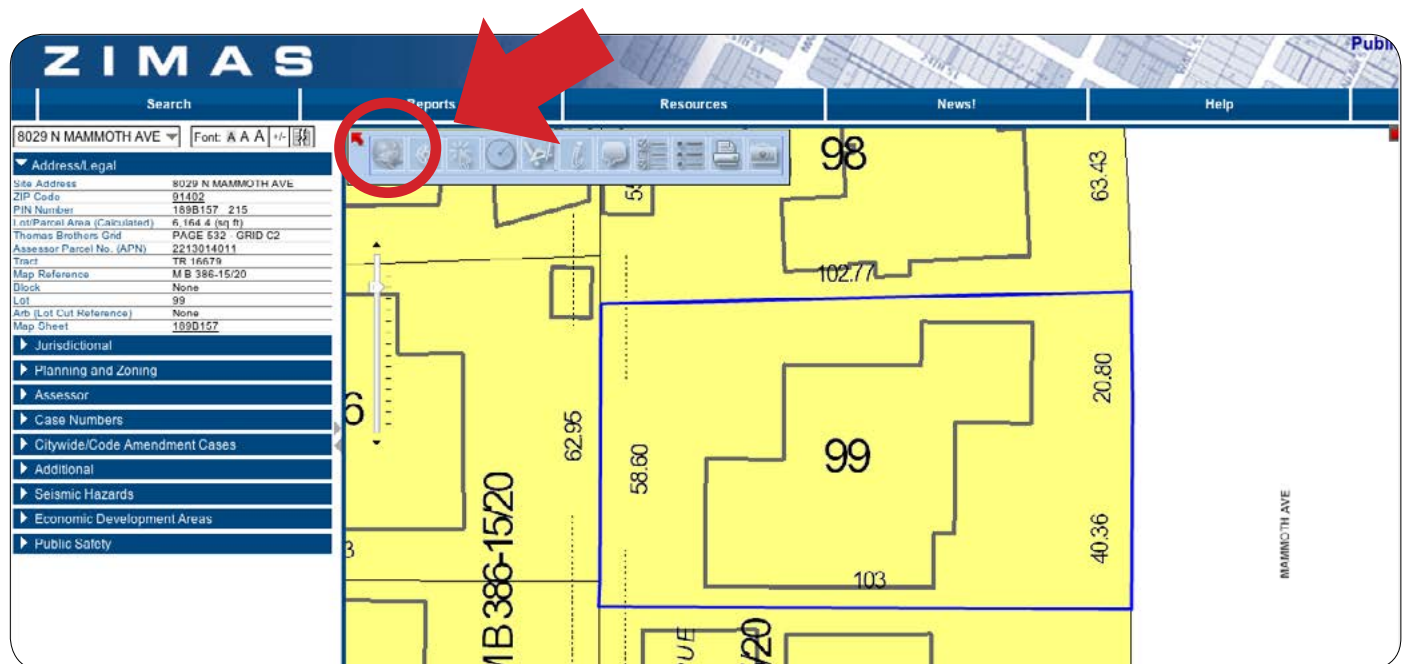
We recommend you use pencil to make your plan so you can erase if needed. Different colored pencils can be used for each layer to help you see the various elements more clearly when you're done.

Step One: Get a Scaled Map of Your Property

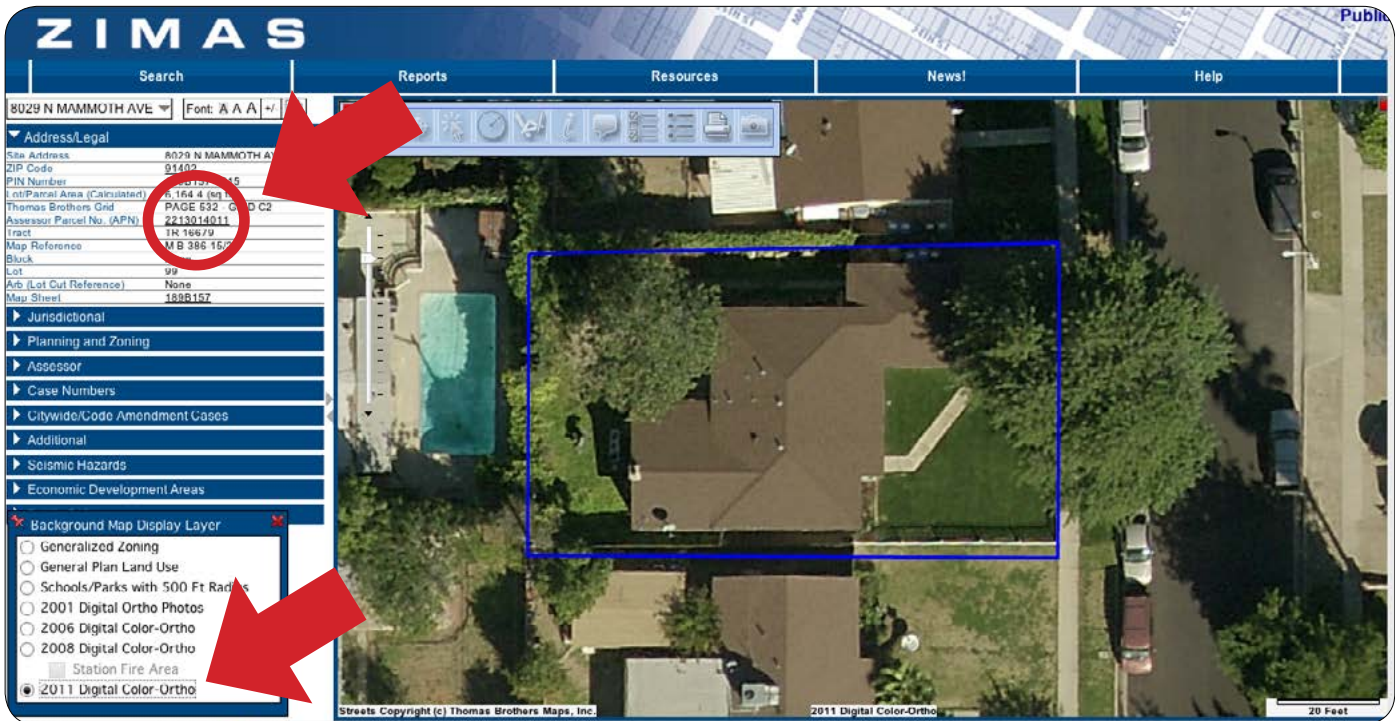
There are several ways you can get dimensions and information about your property, including plans of your house and property, city and county records, and carefully taking your own measurements. Outlined below is a simple way for getting online access to dimensions and important information about site conditions within the City of Los Angeles.

Start at the ZIMAS Website: <http://zimas.lacity.org>

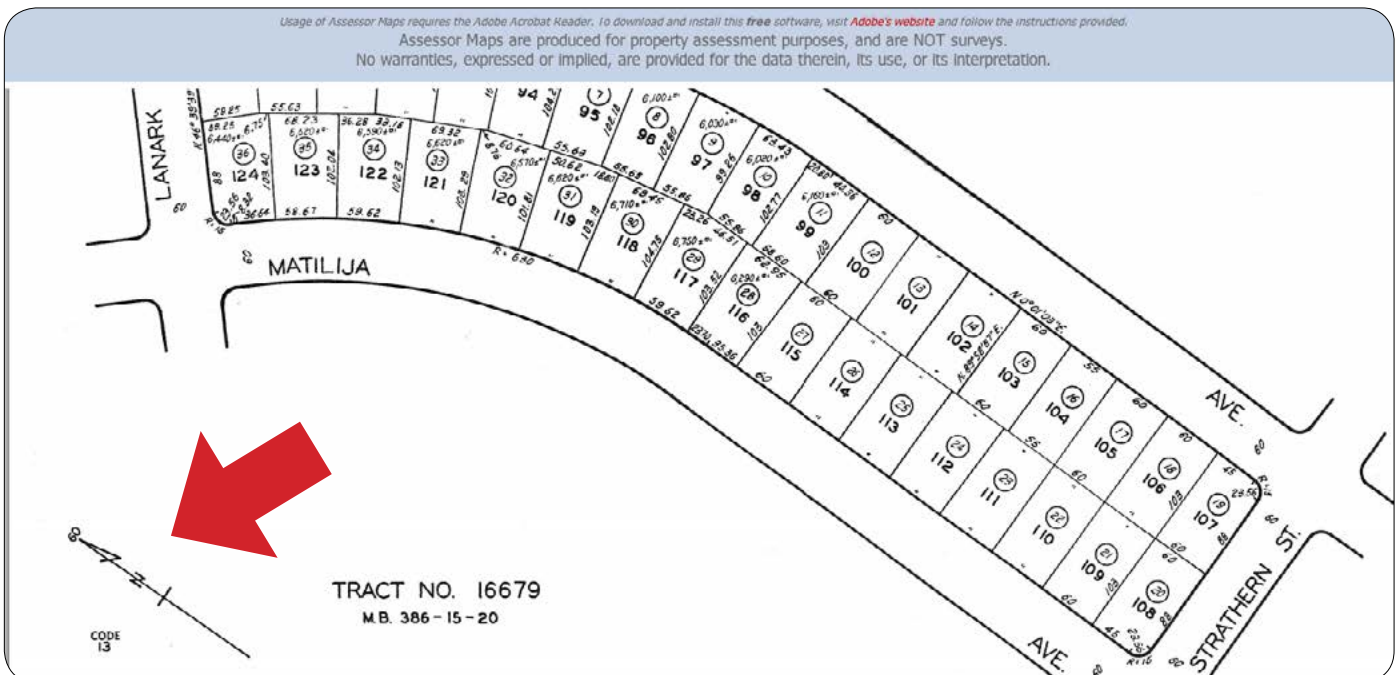
- **Enter your house number and street name** in the pop-up window & click **GO**. Zoom in to get a close view of your lot, and to see property dimensions that are usually indicated.
- Locate the icons in the upper left hand corner of the view window. Click on the icon to change your background display layer and choose 2011 digital color-ortho. This will give you an aerial photo of your property. Click on the printer icon and **PRINT this out**.
- Additional information about your property can be found in the dropdown menus to the left. The Planning & Zoning drop down menu will tell you if your property is in a Hillside zone, and the Seismic drop down menu will tell you if it is in a Liquefaction zone.
- Open the Address/Legal drop down menu and click on Assessor Parcel No. (APN). A new window will open with the County tract map of your immediate neighborhood, the dimensions of your property, and an arrow showing North.



Once you have entered your address on the Zimas website you will see a zoning map of your neighborhood. Click on the icon in the upper left-hand corner of the view window to bring up the aerial map menu. Screen capture from ZIMAS



Select the 2011 digital color-ortho option in the bottom left of the menu bar (indicated by the arrow at the bottom right) to bring up the most current aerial map data. The Assessor Parcel No. link can be found under the address/legal tab indicated by the arrow at the top right. Screen capture from ZIMAS.



A new window with an assessor map will come up when the Assessor Parcel No. is selected under the Address/Legal drop down menu. The north arrow on this map is indicated with a red arrow. Screen capture from ZIMAS.

Step Two: Draft Your Plan

- **Print** a few copies of the graph paper provided at the end of this document.
- Using the graph paper you can easily **scale your drawing by using the squares**. e.g. 1 Square = 1' or 1 Square = 2'. Find a scale that will accommodate the size of your property at a good size on the page.
- If you are using a ruler, it's the same idea: 1/4" per foot = 1/4 scale, and so on.
- **Note the scale of your drawing at the bottom**, e.g., SCALE: 1 Square = 1' or SCALE: 1 Square = 2'. If you did not scale it, note NOT TO SCALE.
- Draw an arrow showing which way is **North** at the top.
- To start, draw in your **property dimensions** from ZIMAS or the County Assessor's map.
- A house deed or house plan will list your structure dimensions. Otherwise, walk around your property and **measure structures**.
- **Measure and draw in any other structures** such as a garage, carport, porch awning, or shed. Include measurements for the driveway, pathways, and other hard surfaces. **Note what each one is made of** (concrete, asphalt, pavers, gravel, dirt, etc.).
- Be sure to **include the parkways/median** strips between the sidewalk and the street.
- Draw a **dashed line** to indicate the structures' **roof shape** (e.g. pitch of the roof, flat roof, et cetera.).
- **Locate** your utility meters and lines: **water, gas, and electric**. If you are not sure where your utilities are, **Call 811 – this is Dig Alert**, a free service. Use **dots or dashes** to show where the lines run, and label each one.

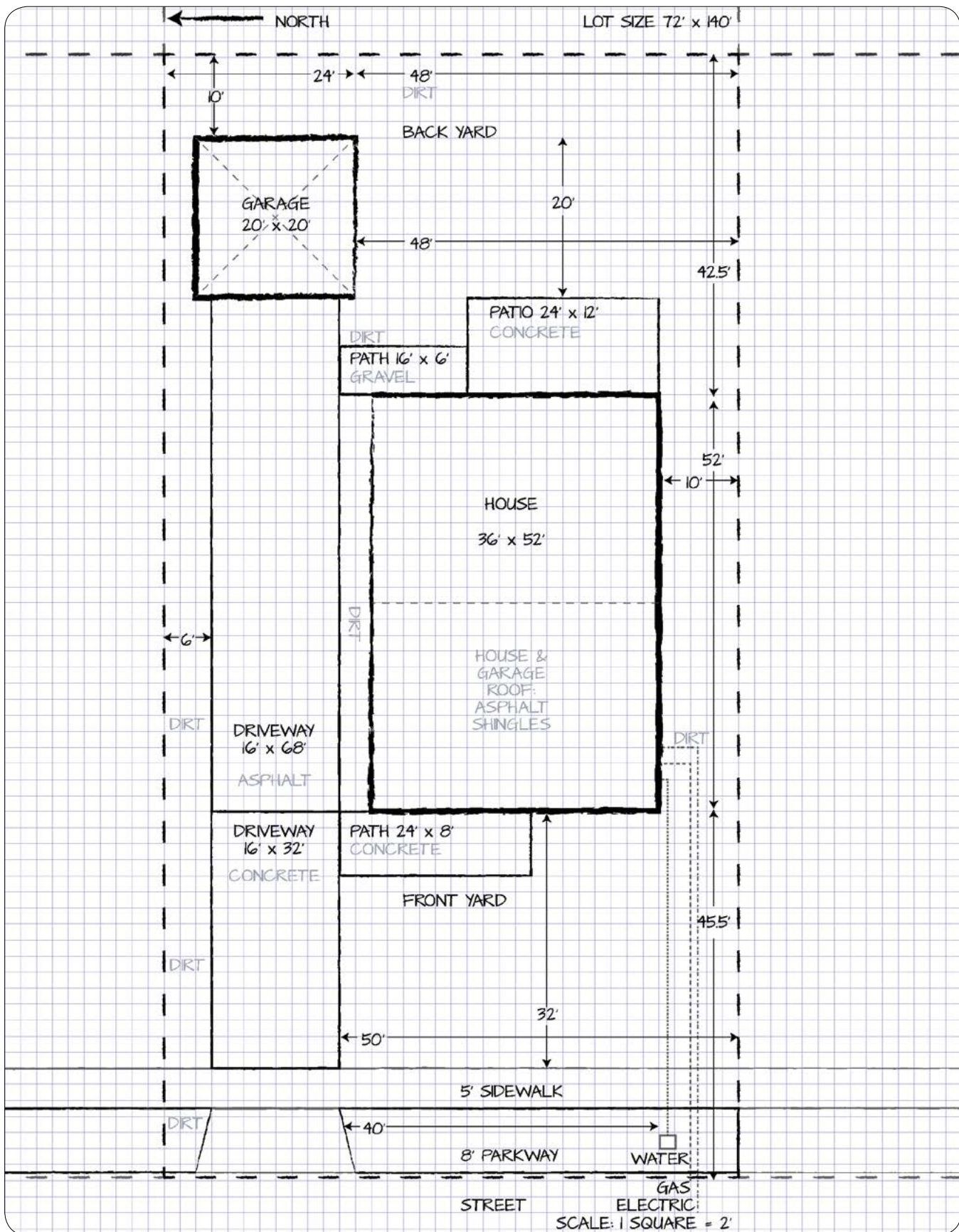
Taking Notes

As you make your assessments, you could use any form of notation to mark up your plans. However, a clear and consistent system of symbols and notes will help to clarify your observations, particularly if you work with any partners, designers, or contractors. We recommend the notation style that we ask partners to use in our workshops to keep all our plans and projects easy to read and compare.

Now make 8 copies of your site plan before you move to the next section.

Extra Copies

Some assessments will be easier to read on their own pages, and plans may be easier to make with more open space to write. Permit applications may also be streamlined by only submitting a copy of the relevant information. Use extra copies of your site plan to take notes for each assessment on different pages.



A scaled plan with dimensions and an accurate north arrow is the foundation for our assessments. Making note of surface characteristics such as paving and roofing will also help to figure calculations and make decisions. Image courtesy of The River Project.

B. Plot the Locations of Trees and Plants

Walk around your property with a copy of your Site Plan, and draw in the location of **trees, shrubs, lawn** and other significant **vegetation**. As you're doing this, look closely at the plants you have, and note whether they seem to be thriving or not. Which ones require a lot of watering? Do any seem to be appropriate for our Mediterranean climate? Mark any plants you want to replace with an **X**.

Trees & Shrubs:

For trees, use a **circle** for the **trunks** and **dashed lines** to mark the **canopy**. For **shrubs**, use a **solid line** to encompass their spread.

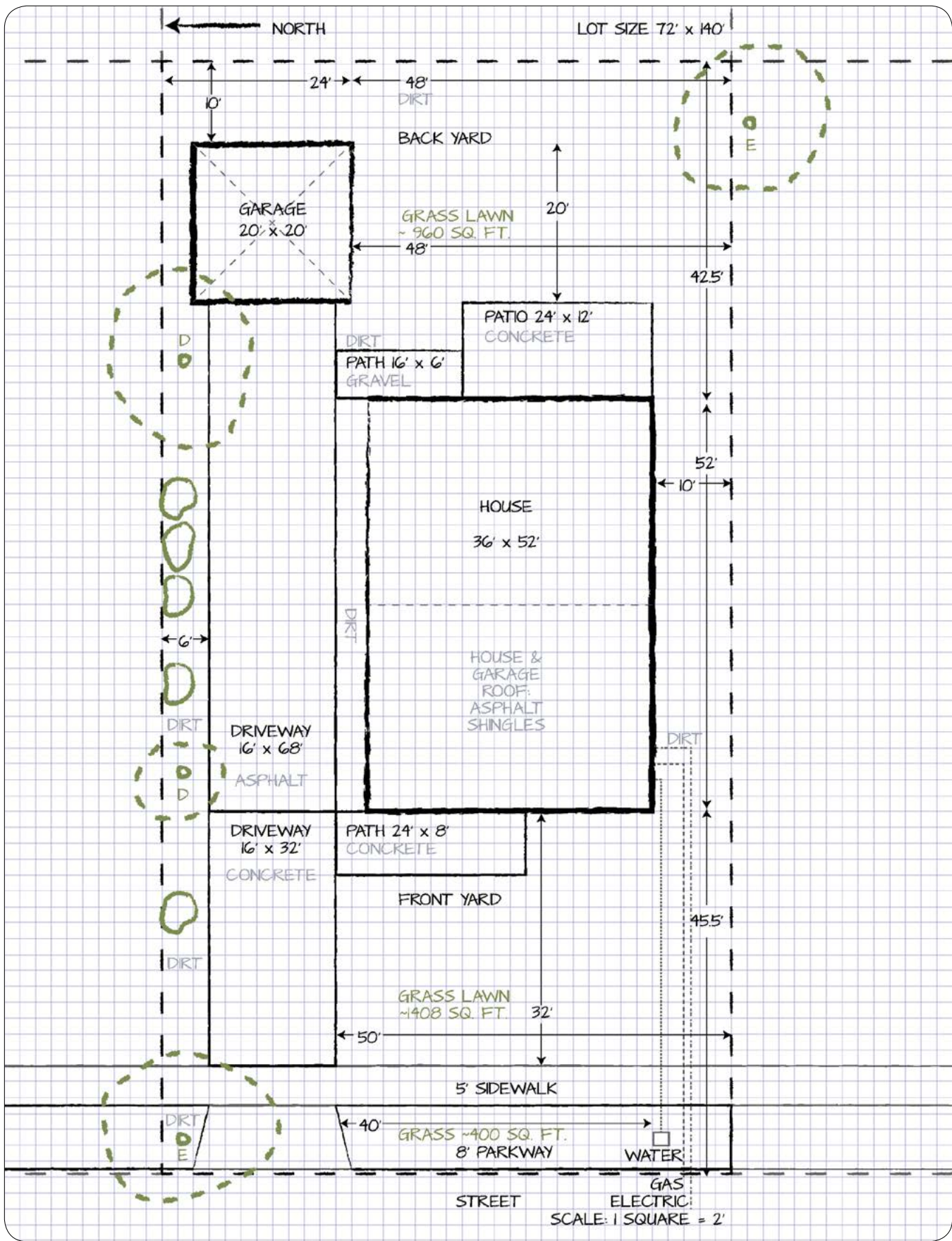
Some trees keep their leaves all year (evergreen) and some lose their leaves in the wintertime (deciduous). This affects the amount of sun your yard will receive at different times of the year, so **mark your trees with a D or an E**.

Softscape:

Label any **grassy areas**, then **calculate their square footage** and indicate it on your drawing.

On the back of your plan, make a note of the general health of the plants you plan to keep. If you can, include their names. If you don't know what the plant is, you can take pictures or samples of the leaves to your local nursery for help with identification.

Did you know: Trees generally prefer less frequent, deep watering. So do well established shrubs, like older roses.



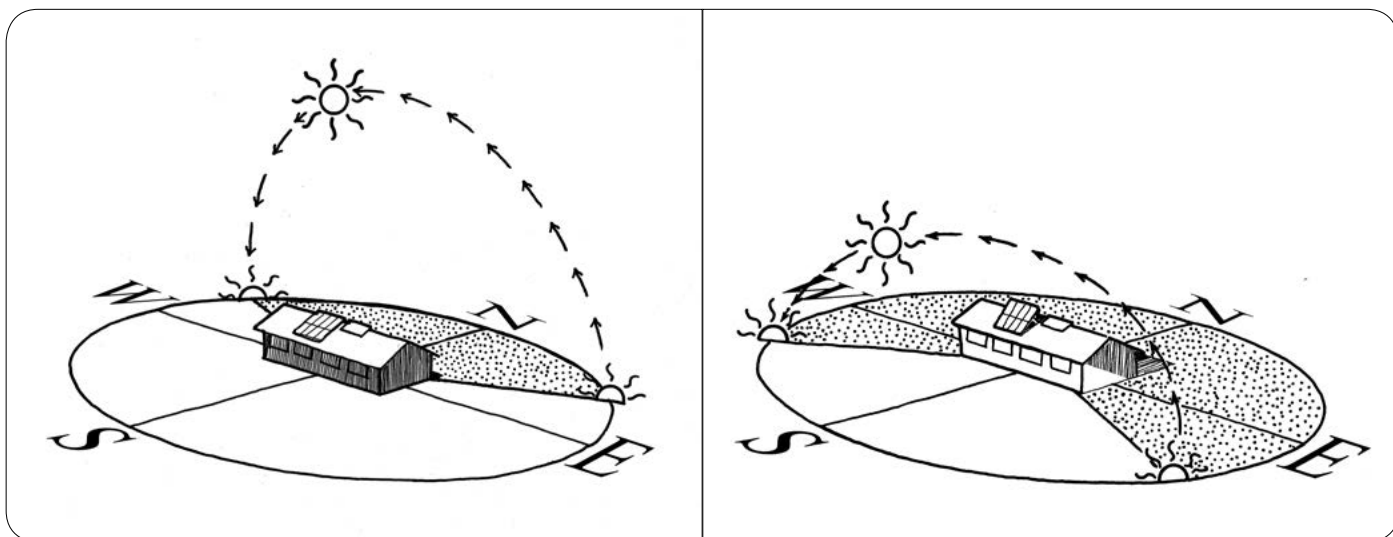
Trees and plants are noted with their footprints on this assessment example. Image courtesy of The River Project.

C. Chart the Path of the Sun

Every property has microclimates that affect how plants will grow. Structures, walls, slopes, and other trees or shrubs may affect an area's sun or shade, and how cold air settles during a frost. We think of the sun as always rising in the east and setting in the west. Actually, during the winter the sun rises a bit south of east, and in the summer it rises a bit north of east. Also, the sun is not as high in the sky during the winter as it is in the summer. So areas on the north side of your house may be completely shaded in the winter, but in summer could receive quite a bit of sunshine.

Chart the seasonally changing **sun** and **shade** patterns of your site. Mark areas that receive sun all day and areas that are shaded all day. Note which areas receive only partial sun, maybe just a few hours of direct sun in the morning, mid-day or in late afternoon. These areas are different in scope during the summer than in winter. Some trees are deciduous (they drop their leaves in winter) and some are evergreen. This can affect the sun patterns in your yard.

Indicate the direction of the sun outside your plan to the south of your property. Consider how the light changes through the day and also in different seasons, with the sun lower in the sky in the winter and higher in the sky in the summer. Make note of any areas that may be in more sun or longer shadows. You may mark areas that receive **full sun** with an **open circle**, areas with **partial sun** with a **partially shaded circle**, and areas that are **shaded** with a **shaded circle**.



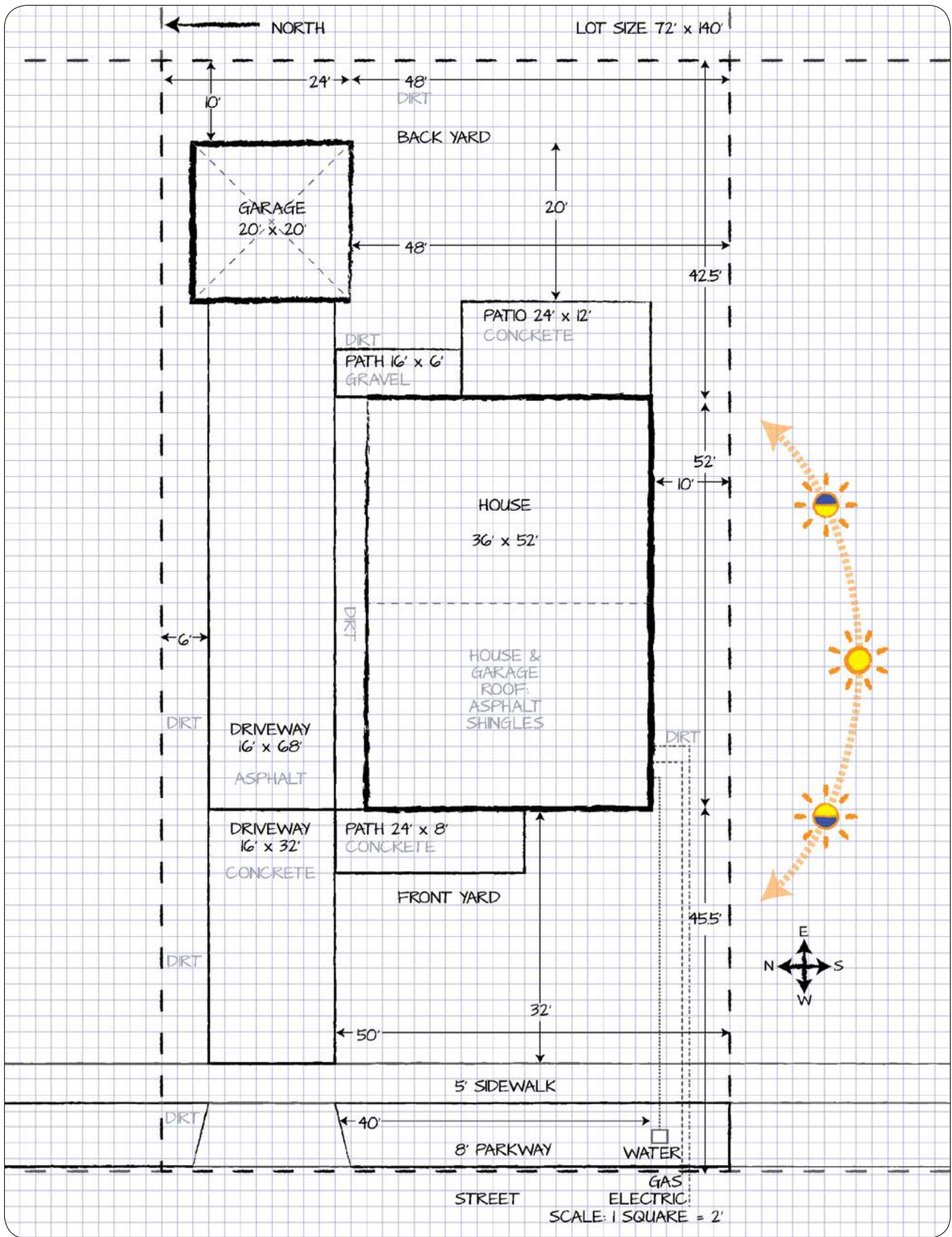
The height of the sun in the sky rises in the summer and lowers in the winter, casting shadows that shift seasonally. Reprinted with permission from "Rainwater Harvesting for Drylands and Beyond" by Brad Lancaster, www.HarvestingRainwater.com

D. Discover What Happens to Water on Your Property

Think of your property as a mini-watershed. The big difference between a natural watershed and your property is that in nature, much of the water gets absorbed and cleaned by soil and plants before it hits our waterways. Our city was specifically designed to throw water away quickly, so rain falls onto our roofs, hardscapes, and lawns, and then flows directly out into the street gutters, catch basins and beyond.

There are a few ways to determine the path water takes across your property: **turn on your irrigation system** to see what happens when you water, **turn a hose on your roof**, or **observe what happens when it rains**. Irrigation water leaving your property is called Dry Weather Runoff. Rainwater leaving your property is called Wet Weather Runoff. We will gather information to help estimate both.

Turn on your irrigation system so you can watch what happens.



The path of the sun is generally indicated off to the side of this plan. You may also include specific notes about different spaces on the plan itself. Image courtesy of The River Project.

Mark the location of your **sprinkler valves** on the plan with an x in a circle. Then mark all **sprinkler heads with an x**. Indicate which valve they run off of by turning on each line separately and marking each valve and connected line with a different color. We suggest using colored pencil that is easy to erase.

Overspray Areas: Note any areas where you seem to be **irrigating pathways, patios, sidewalk, driveway, or the street**.

Ponding Areas: Note any areas where **water puddles** when it rains or when you water. If you have areas where water tends to collect on bare soil, it's a good indication that these areas could use some mulch.

Make some notes on the back of your plan whether you can save water by changing the timer on your controller or change certain sprinkler heads to more efficient drip irrigation. Note any heads that should be changed or capped to eliminate overspray, and areas of bare soil that could benefit from a layer of mulch.

Now turn the hose on to your roof for a few minutes before you turn off the irrigation system so you can watch what happens when it really rains.

Downspouts: If your home has roof gutters, it will have downspouts. Note on your plan where **downspouts** are with **small circles**. If your home was built or re-built recently, your downspouts may connect to a pipe underground that ends at a hole in the curb at the street gutter. If so, **note that** on your plan.

If you don't have roof gutters and downspouts, make sure you've noted the type of surface the water falls on when it sheets down from the roof eaves.

Erosion: Note any areas of **erosion** (check under your downspouts or eaves).

Flow direction: Draw **arrows** on your Site Plan to indicate the direction water moves through your front and back yard, across any hardscapes, and down the street gutter.

How Much Water Runs Off Your Roof:

Knowing how much water runs off your roof during a typical rain will be very important in any rainwater-harvesting project. Although rainfall patterns are quite variable in our region and sometimes bring much more rain, a typical rainfall from a storm in Los Angeles is 3/4", so we will use a 1" storm for our purposes.

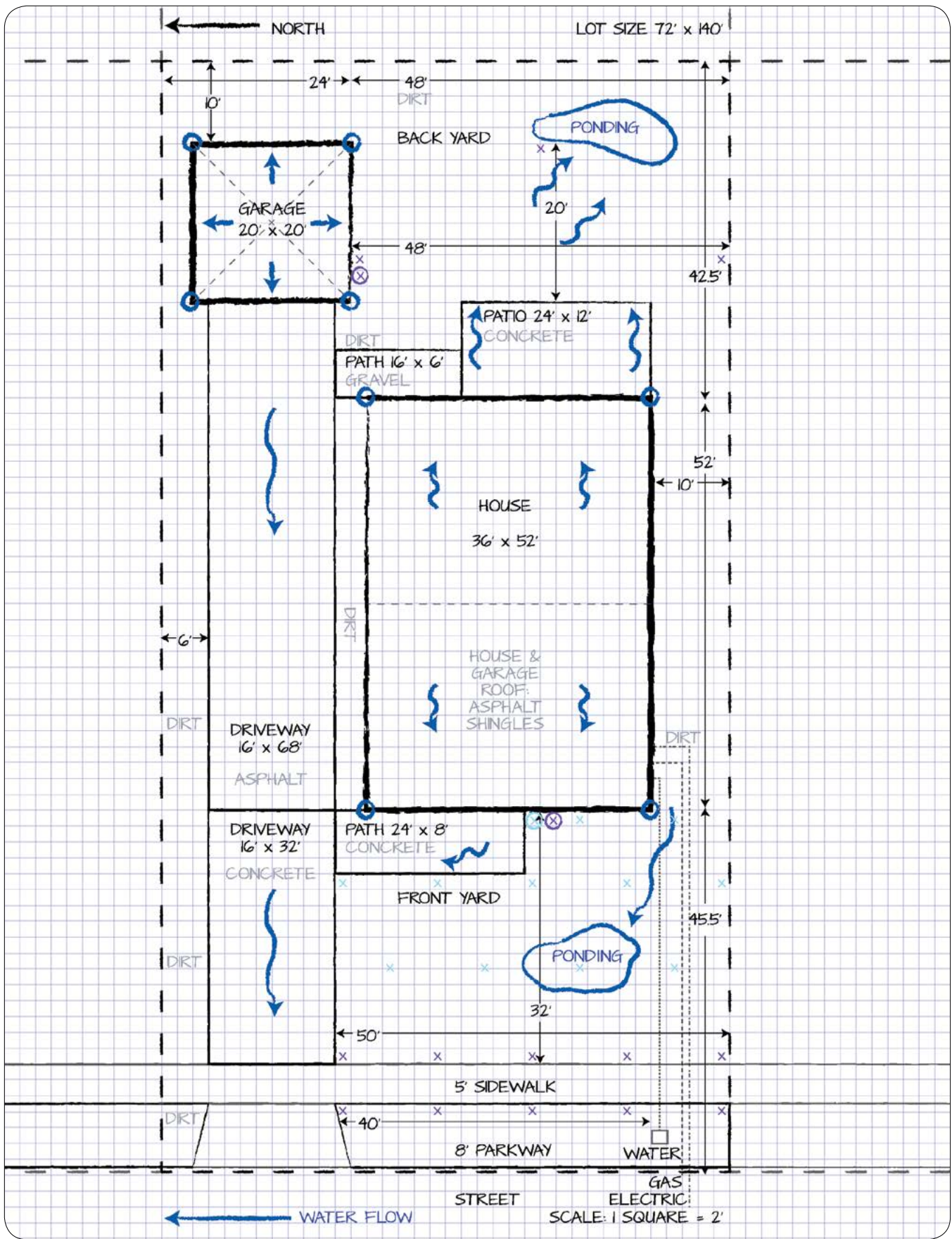
Some general rules of thumb can be applied: about 600 gallons of water can be harvested from a 1" storm falling on a 1,000 square feet of roof. This formula can help you determine how much rain runs off your roof in a given storm.

Amount of Roof Runoff Generated for a Given Storm Size (Gal.)					
Storm Size (Inch)	Roof Size (Square Feet)				
	100	250	500	1,000	1,500
1.00"	60	155	310	620	940

On your site plan, you've drawn and measured the dimensions of your roof. Now you can **calculate the total area of your roof**. It doesn't matter how your roof is shaped. A pitched roof and a flat roof have the same footprint.

You can also calculate the area (Width x Length) of roof that flows into each of the downspouts. If you have no downspouts, the calculation still informs you how much water is flowing off specific sections of your roof to a particular area.

You can use the same types of calculations to determine how much water is coming off of any hard surface. These calculations are basic information to help you learn just how much rainwater you can harvest for outdoor use instead of using drinking water.



The direction and drainage of both wet and dry weather runoff is indicated with arrows and notes. Image courtesy of The River Project.

E. Determine Your Soil Characteristics

Your ability to capture rainwater is affected by various factors, but one of the most critical is your soil. The health of your soil will impact not only its ability to absorb water but it is key to what makes plants thrive. It's time to get your hands dirty.

Soil Texture: Soil textures range from sand to silt to clay. Sand is the largest particle size that drains the fastest, and clay is the smallest size that easily compacts and drains the slowest. Silt is in the middle, and loamy soil is a combination of all three sizes. A simple way to find out about soil composition is to do what is called a soil ribbon test.

Take a small handful of soil, moisten it with water and try to roll it into a ball. Squeeze it and check to see if your fingers leave an impression. With the ball of soil between your thumb and forefinger, squeeze it gently upwards with your thumb to form a ribbon (don't try making a ribbon by rolling between your palms as that will skew the results). As the ribbon gets longer, note how long it gets before it breaks from its own weight.

Results of Ribbon Test	Soil Type
Soil does not stay in a ball. Loose and gritty feeling when moistened.	Sand
A cast, or molded imprint on your fingers forms, but it breaks easily. It does not form a ribbon. Soil feels slightly gritty.	Sandy Loam
A short ribbon can be formed but breaks when about 1/2" long	Loam
A ribbon can be formed. It is moderately strong until it breaks at about 3/4" length. Soil feels slightly sticky.	Clay Loam
The soil can be easily formed into a ribbon that is an inch or more long. Soil feels very sticky and smooth.	Clay



Sand



Sandy Loam



Loam



Silt Loam



Clay Loam



Clay

Images courtesy of the USDA Natural Resources Conservation Service (NRCS) Soil Survey

Soil Permeability Rate: Take the following steps to determine how quickly water sinks into your soil.

- (1) Dig a hole about 1 foot deep and wide, about the size of the head of your shovel.
- (2) Fill the hole with water slowly and then **let it completely drain**.
- (3) Now, slowly **refill** with water and measure the depth of water with a ruler.
- (4) Measure again in 15 minutes, noting how many inches the water level has dropped. Multiply by 4 to calculate how much water drains in an hour.

More than 6 inches per hour: You have **fast-draining** soil.

4 to 6 inches per hour: Your soil drainage is **good**.

1 to 3 inches per hour: Your soil drainage is **ok**, but could probably use a little amending.

Less than 1 inch per hour: Your soil drainage is **poor**.

If your soil permeability rate is poor, you might need to consider options such as rain barrels or cisterns to capture water. Any changes you make to your land to increase the soil's capacity to hold rainwater should be very shallow and very wide.

Soil characteristics can vary significantly even within a small area. Conducting soil tests in multiple locations across your property can help give a clearer picture of your overall site conditions. Note your results on the back of your plan. Soil drainage may be improved and compaction remediated through aeration and the addition of amendments like compost.



(1) Dig a hole about one foot deep and wide, as deep and wide as your shovel.

(2-3) Slowly fill the hole with water, let the water drain, and slowly fill again. If the water is filled too quickly fine sediment in the hole can fill porous spaces and slow down infiltration, skewing your test results.

(4) Set a timer for 15 minutes. When the time is up measure how far the water level has dropped and multiply by 4 to estimate an hourly rate.

F. Find the Water Reuse Opportunities Inside Your House

If you are considering reusing water from inside your house (greywater), mark the location of your **bathtub/showers, bathroom sinks and laundry facilities** on your plan **with a star** and label each one.

Mark on your notes whether your house is **on a raised foundation or a slab**. This may factor in to your decision-making about greywater.

Note that you cannot reuse water from kitchen sinks or toilets.

G. Current Water Use/Water Goal

It's important to understand how much water you are using now, and then determine if there are ways to reduce that number.

In Southern California, it takes about 48" of water per year to irrigate one square foot of turf, or about 30 gallons per year per square foot.

On your plan, you calculated how many square feet of your landscape is grass. Now plug that number into this formula:

"X" Sq. Ft. x 30 = Gallons of drinking water used for your turf each year

If you have 1,000 Sq. Ft. of grass: $1,000 \times 30 = 30,000$ gallons per year. If you are over-watering as many do, it could be 2 to 3 times more than that.

Not all plants need the same amount of water. Grass is among the thirstiest, while climate-adapted plants and those native to our region require much less. If the same 1,000 Sq. Ft. were planted with natives adjusted to your site conditions instead of turf, it would only need 6,000 gallons per year rather than 30,000.

Drinking water used for lawn is: _____ gallons per year.

If that number seems high, consider replacing some or all of your lawn to more climate appropriate plantings. Such a change can be beautiful and make a difference to more than just your water bill.

Find great plant suggestions and planting tips in the WaterLA Plant Selection Guide online at <http://waterla.org/help-how>

I would consider changing _____ square feet to native plants, which would save _____ gallons of drinking water per year.

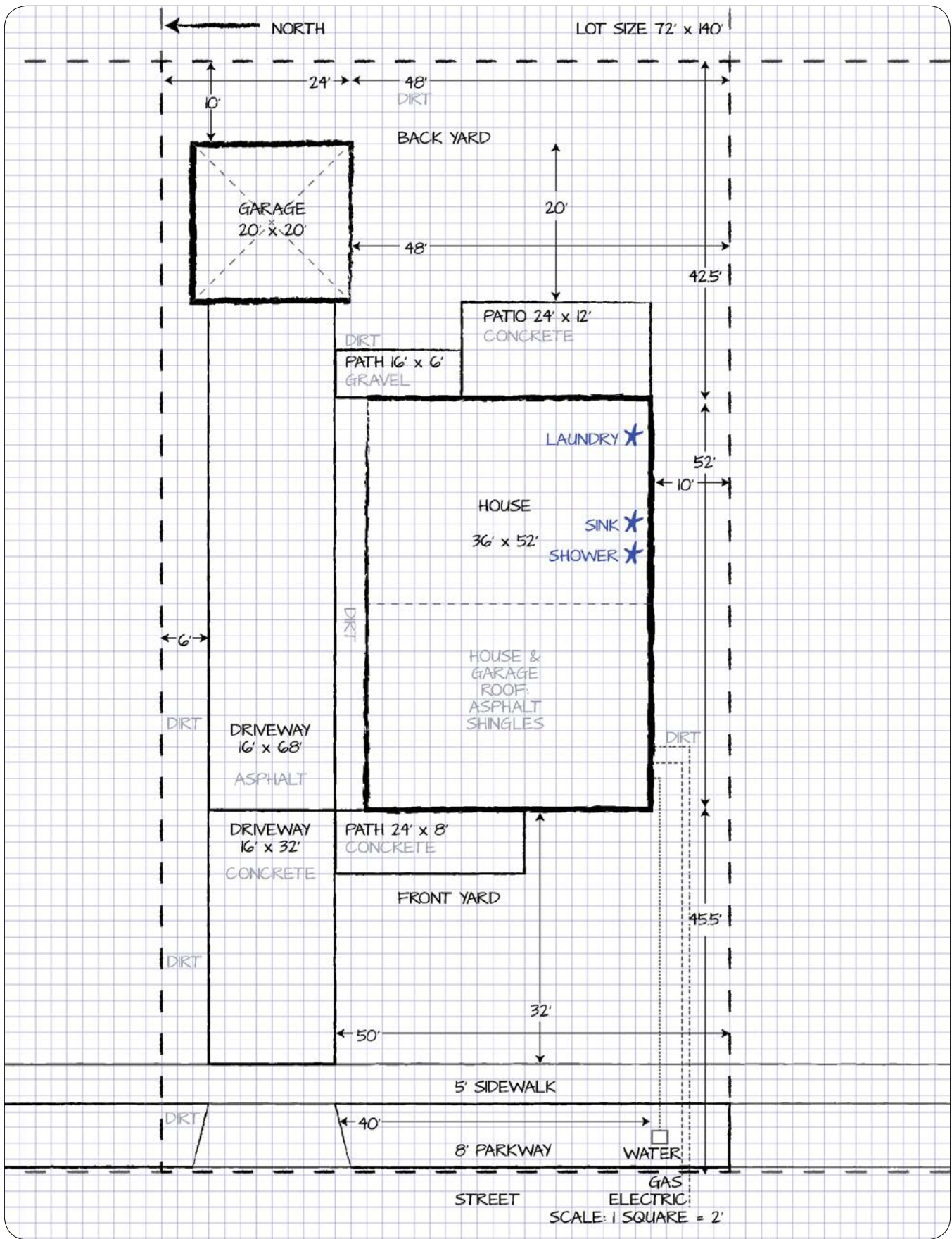
Another thing to consider is how much drinking water you use for washing clothes. For example an average family of 4 uses 12,000 gallons of water/year doing laundry.

Investing in a high-efficiency washer can reduce that consumption by half. Another option is using some of that laundry greywater to irrigate ornamental plants or fruit trees.

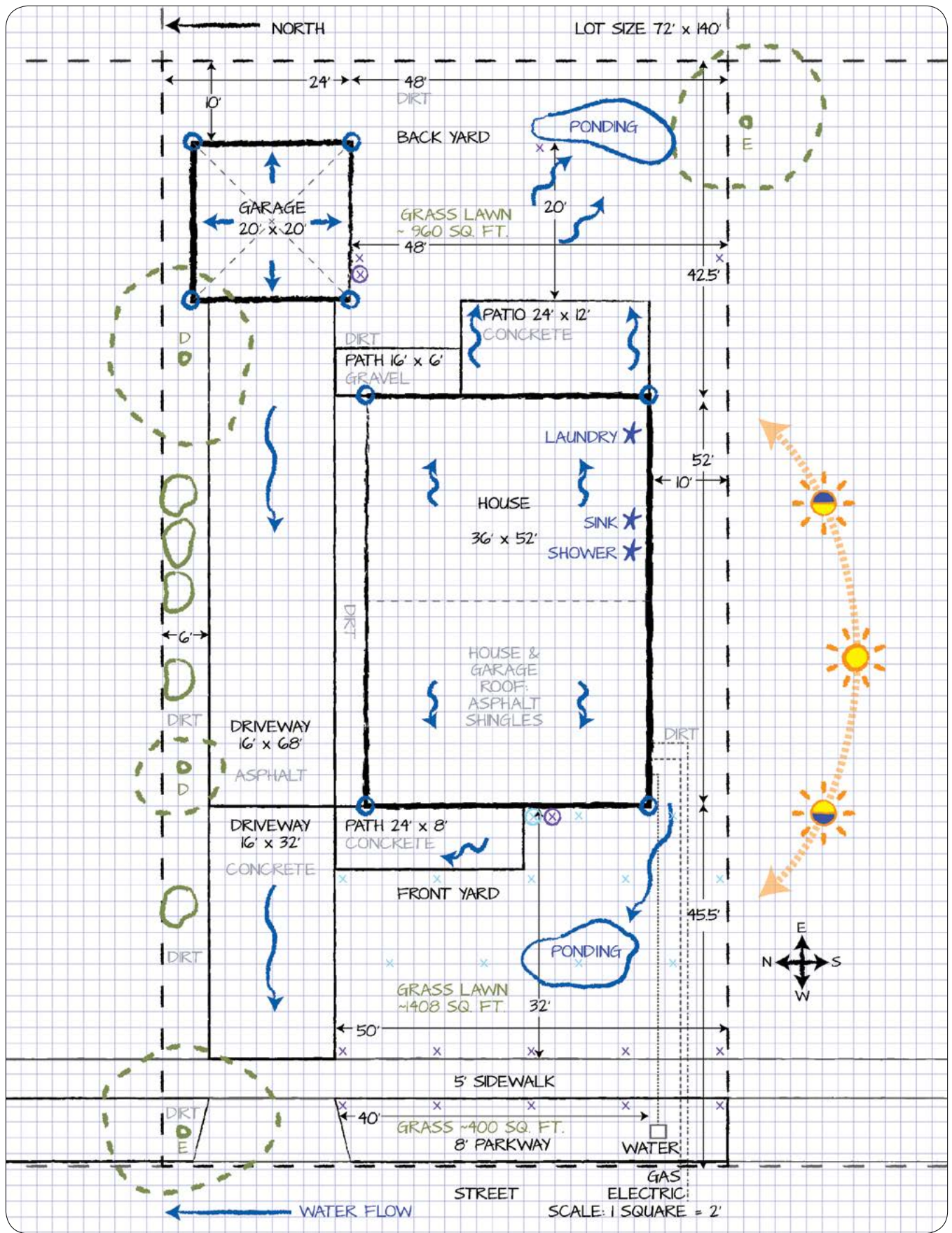
Drinking water used for laundry is: _____ gallons per year.

I would consider using a laundry-to-landscape greywater system to water ornamental plants or fruit trees, which would save _____ gallons drinking water per year.

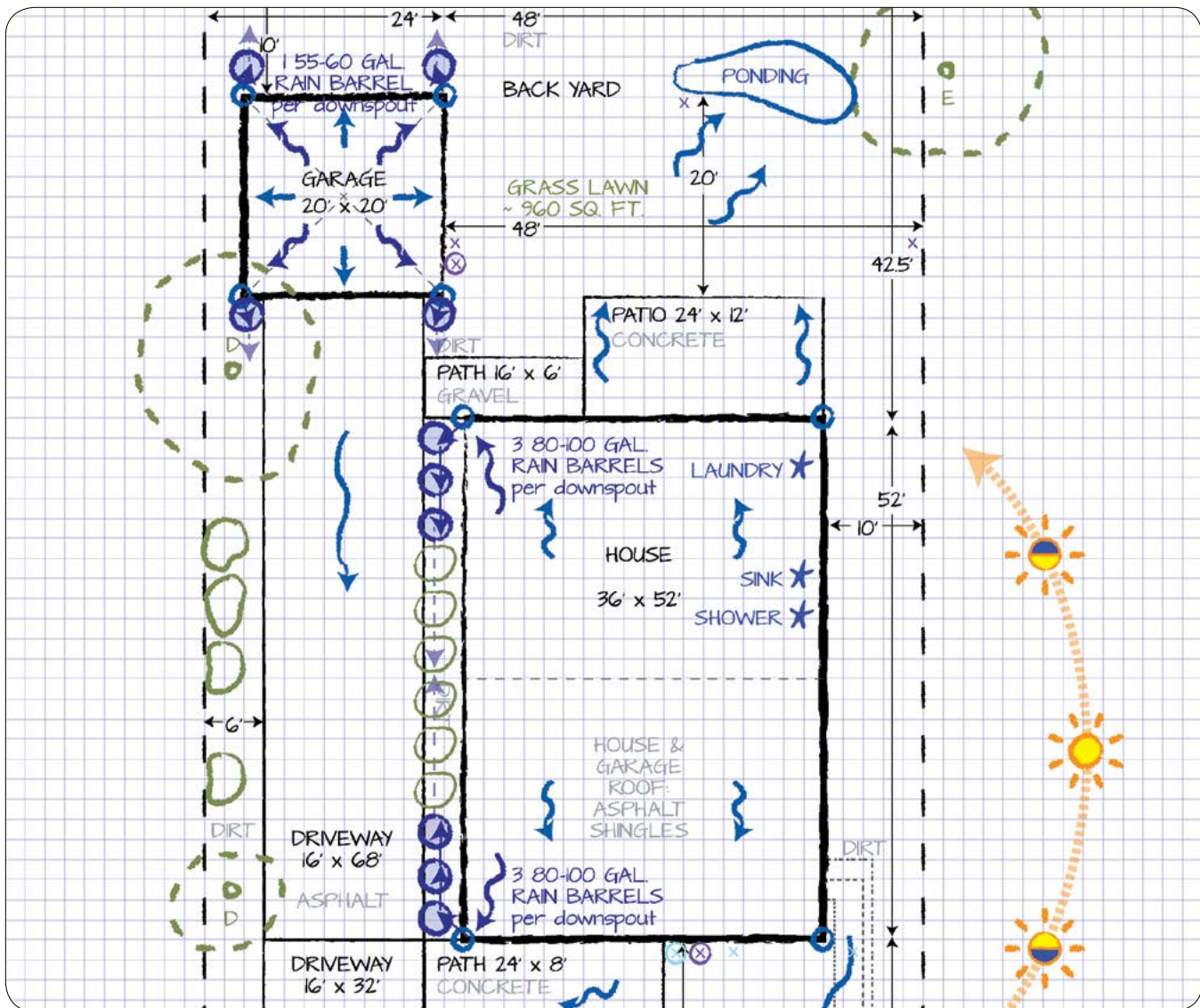
On the following pages the notes from this how-to are combined. Potential projects appropriate for the example conditions are also incorporated. To learn more about potential projects and how to use these site assessments access the Water LA series online at <http://waterla.org/help-how>



Bathtubs/showers, bathroom sinks, and laundry facilities are all potential sources for landscape water use. Image courtesy of The River Project.



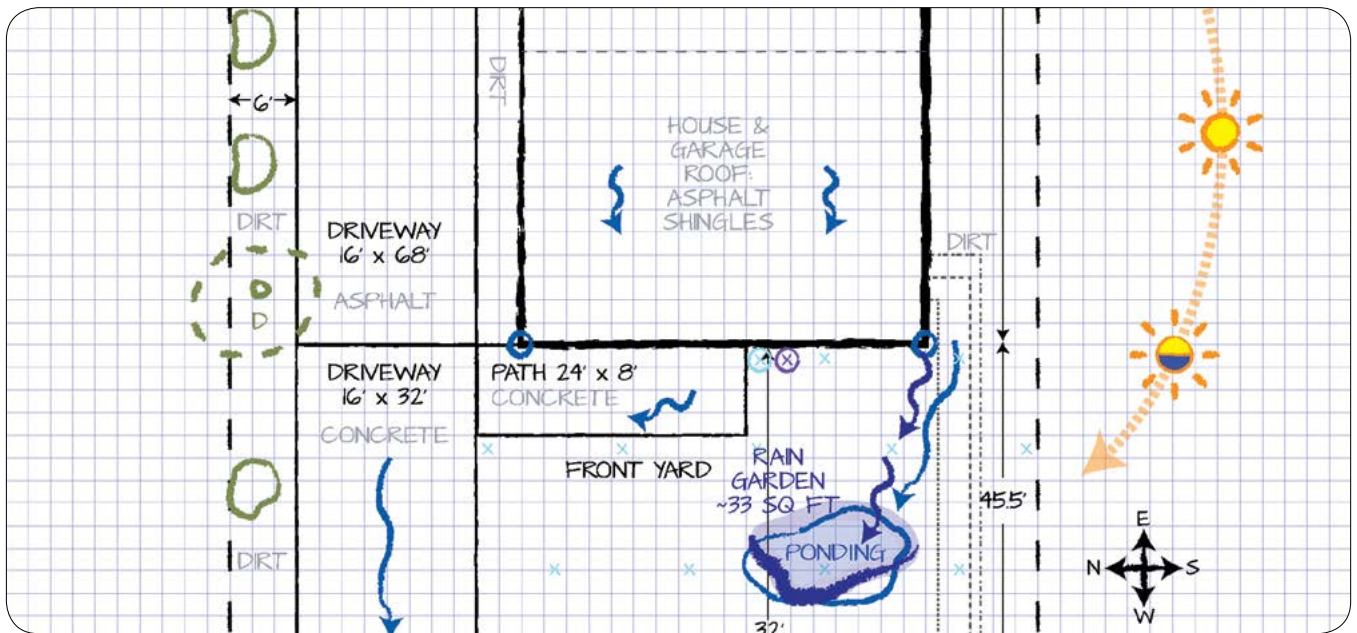
Assessments of dimensions, existing plants, sun and shade, and water runoff are combined in this example. Image courtesy of The River Project.



Rain barrels are a great way to capture water from downspouts. In this combined plan rain barrels are linked on the north side of the house in shade to discourage bacteria and algae growth. Additionally, barrels capture some of the water flow coming off the side of the garage that would otherwise flow off the property unmitigated. For more information see the [WaterLA Rain Barrel Guide](#). Image courtesy of [The River Project](#).



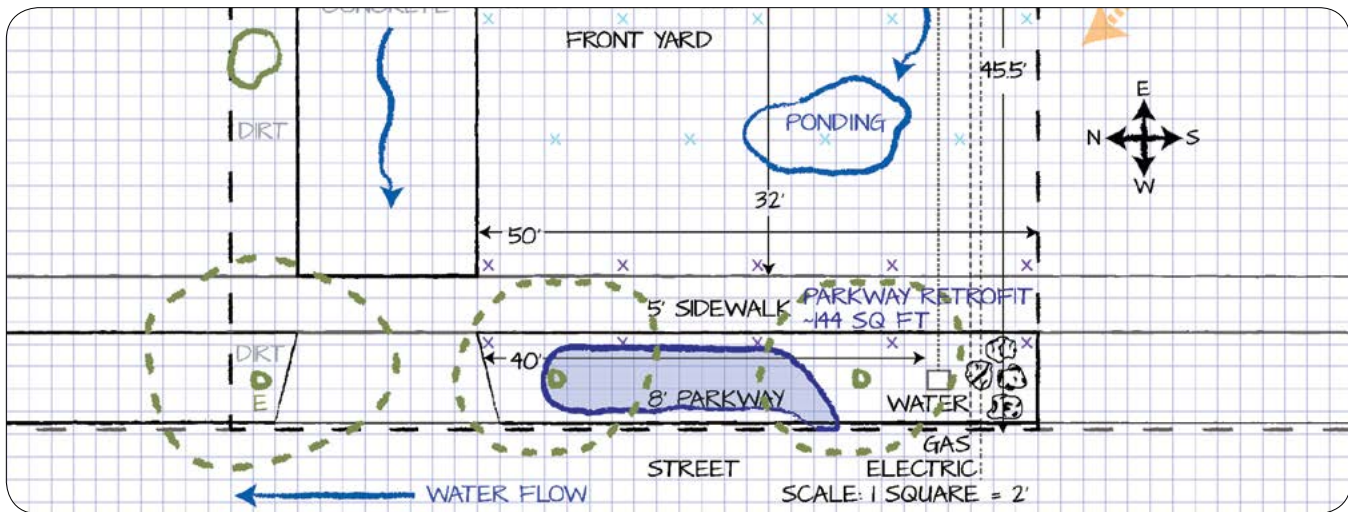
Center image courtesy of [The River Project](#). Left image: [thisoldhouse.com](#) right image: [centralcoastgardening.com](#)



Rain gardens are a great way to capture water runoff, especially in locations where water naturally stands and puddles. In the combined assessment example, water from a downspout could be directed into a flat space contoured for rainwater capture. The sun and partial shade in this location also provides a wide variety of options. For more information see the WaterLA Rain Gardens Guide. Image courtesy of The River Project.



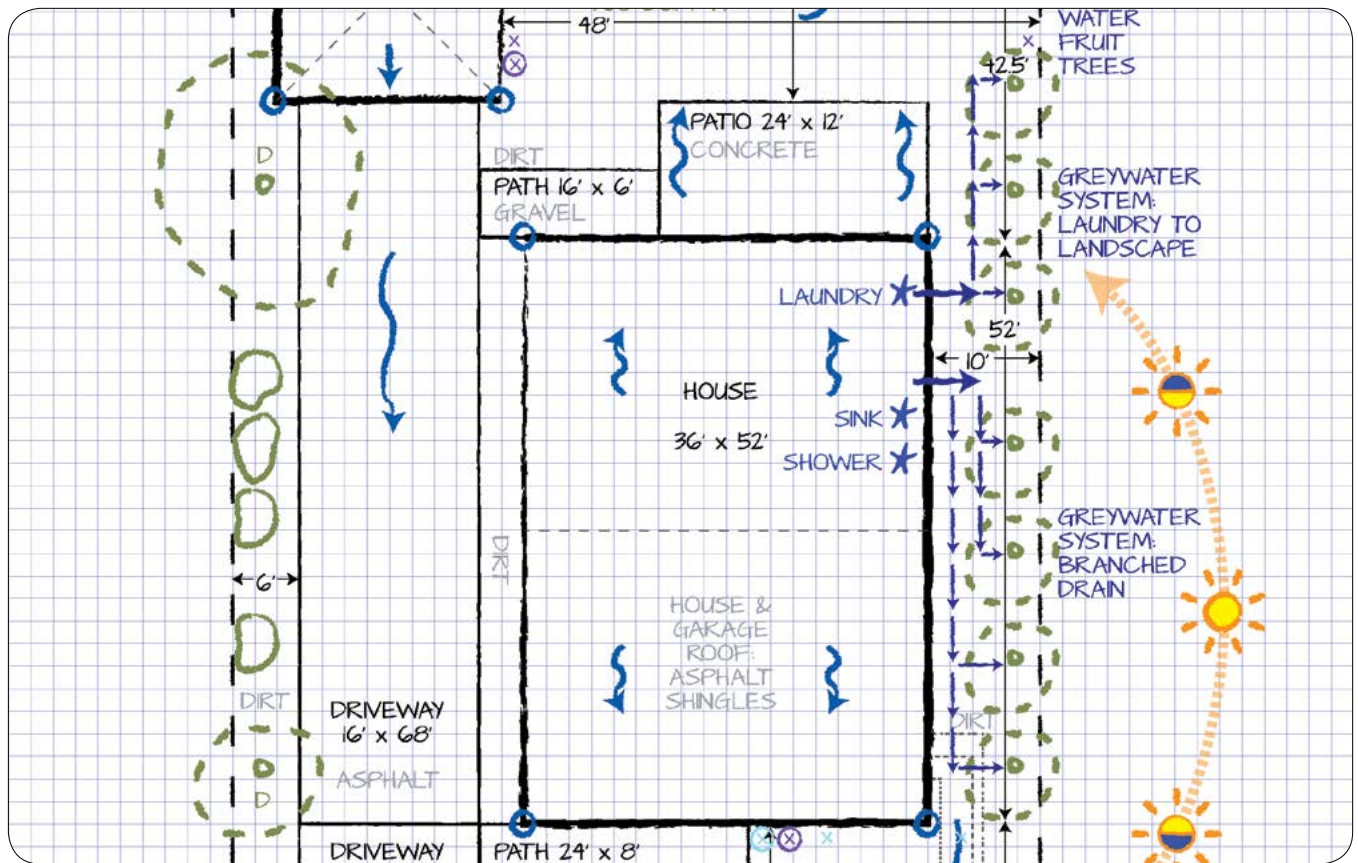
Left image courtesy G3 Green Gardens Group, right image courtesy of The River Project.



Parkways are a great place to reduce flooding, improve water quality, and even improve habitat in your community while enhancing the look of your home. In the example project most water is captured on the property, with overflow going down into the street. The open sun in this parkway will be great for many street trees approved by the City of Los Angeles. Water can also be captured from the street in the parkway with curb cuts and simple soil contouring to support plants and a healthier watershed. Check out the WaterLA guide Parkway Retrofit. Image courtesy of The River Project.



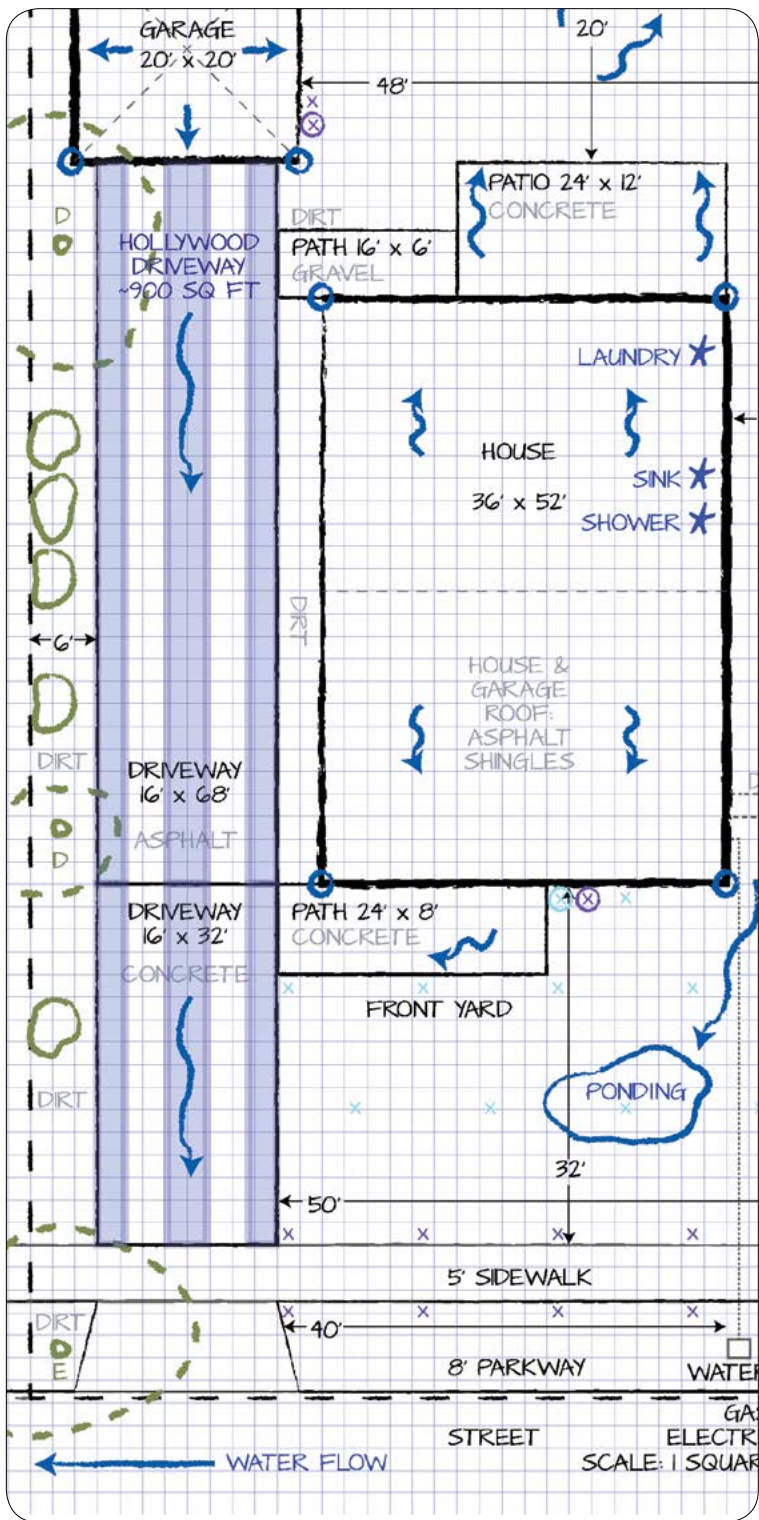
Left Image Courtesy Surfrider Foundation, center image courtesy G3 Green Gardens Group, right image courtesy of The River Project.



A lot of water used in the home is still good for other purposes. Showers, bathroom sinks, and washing machine water could be a great source of steady irrigation for the yard. The utilities in this plan are accessible for minor improvements that can direct gently used water out to fruit trees and shrubs. The trees planted on the southern face of the house are semi-dwarf varieties to avoid shading the house in the winter. Find out more in the WaterLA Greywater Guide. Image courtesy of The River Project.



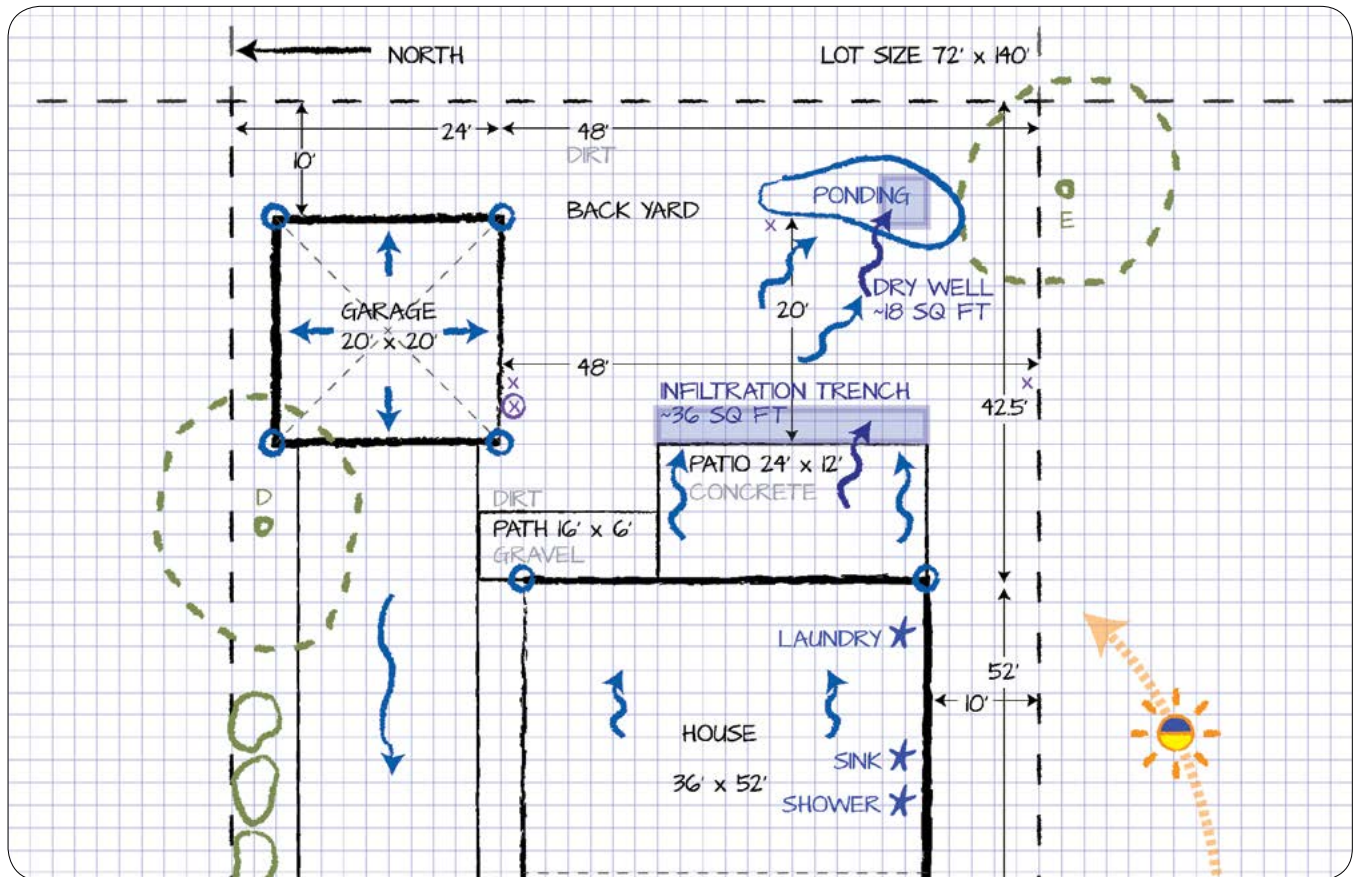
Left and center images courtesy the Greywater Corps, right image courtesy of The River Project.



Breaking up hard surfaces increases the area where water has an opportunity to slow down and sink into the ground. Infiltration is essential for reducing overwhelming runoff and recharging groundwater. Breaking up the driveway is a great place to do this. In the example a Hollywood driveway with enough paving for tires is proposed to capture a lot of runoff flowing over the concrete and asphalt driveway. Find out more through the WaterLA guide (Not) Hardscapes. Image courtesy of The River project.



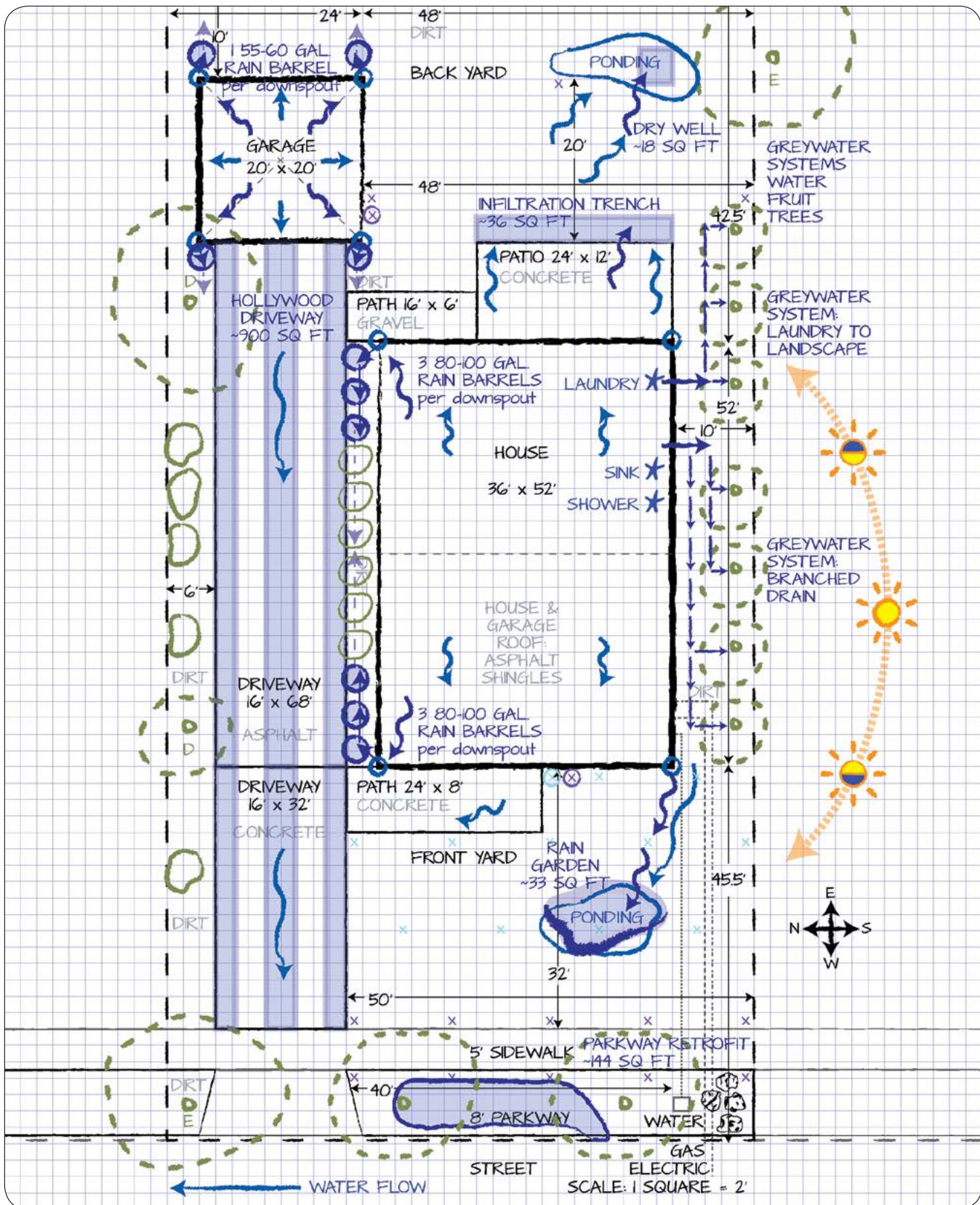
Center image courtesy of Marilee Kuhlman, top and bottom images courtesy of The River Project.



Dry wells and infiltration trenches are good ways to soak water into the ground where space is limited or conditions are not appropriate for other rainwater capture strategies. In the plan example, sheet runoff from the concrete patio and a ponding area in the yard may be good places to consider digging down to capture rainwater. A rain garden might be a better alternative if enough room can be made around the active use of the yard. Otherwise, sheet flow could be captured by either installing an infiltration trench or a dry well. To learn more about these improvements reference the WaterLA Dry Well and Infiltration Trenches Guide. Image courtesy of The River Project.



Images courtesy of The River Project.



This is the example plan of combined site assessments with all of the projects proposed to improve the observed site conditions. Follow the respective guides to learn more. Image courtesy of The River Project.

Check List

Has everything been covered? Check to make sure the following have been addressed:

- ☐ A. Scaled property dimensions
- ☐ A. True north
- ☐ A. Scaled building dimensions
- ☐ A. Surface cover material (concrete, asphalt, soil, etc.)
- ☐ B. Existing plant inventory
- ☐ B. Square footage of lawn
- ☐ C. Sun and shade
- ☐ D. Locate sprinklers and valves
- ☐ D. Direction and drainage of water runoff including your street gutter
- ☐ D. Locations of downspouts
- ☐ E. Soil composition
- ☐ E. Soil drainage
- ☐ F. Locations of bathtub/showers, bathroom sinks, and laundry facilities
- ☐ G. Current water use
- ☐ G. Water use goals

Reference Material

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1 square = 1/8"